Copy for the elected Office (EO/US)

10/C69276

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF WITHDRAWAL OF PRIORITY CLAIM

(PCT Rule 90*bis*.3 and Administrative Instructions, Section 415(a) and (b))

To:

ANGLEHART, James
Swabey Ogilvy Renault
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

Date of mailing (*day/month/year*) 08 May 2002 (08.05.02)	
Applicant's or agent's file reference 14836-1PCT	**IMPORTANT NOTIFICATION**
International application No. PCT/CA00/01026	International filing date (*day/month/year*) 01 September 2000 (01.09.00)
Applicant MICROBRIDGE TECHNOLOGIES INC.	

1. The applicant is hereby notified that **the priority claim made in the international application has been withdrawn** in accordance with a notice of withdrawal received from the applicant on:

   04 March 2002 (04.03.02)

   The attention of the applicant is drawn to the fact that the withdrawal of the priority claim will result in the re-calculation of time limits which have not already expired (see Rule 90*bis*.3(d)).

2. ☒ In the case where **multiple priorities** have been claimed, the above action relates to the following priority claim(s):

US	03 September 1999 (03.09.99)	60/152,487
US	03 September 1999 (03.09.99)	60/152,464
US	03 September 1999 (03.09.99)	60/152,460
US	03 September 1999 (03.09.99)	60/152,461

RECEIVED
SEP 24 2002
TC 2800 MAIL ROOM

3. A copy of this notification has been sent to the receiving Office and to:

   ☒ the International Searching Authority *(where the international search report has not yet been issued)*

   ☒ the designated Offices *(which have already been notified of the receipt of the record copy)*

   ☒ the International Preliminary Examining Authority

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
David LOPEZ-RAMIREZ

Telephone No. (41-22) 338.83.38

TENT COOPERATION TREA . Y

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

ANGLEHART, James
Swabey Ogilvy Renault
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

Date of mailing (day/month/year) 05 July 2001 (05.07.01)	
Applicant's or agent's file reference 14836-1PCT	**IMPORTANT NOTIFICATION**
International application No. PCT/CA00/01026	**International filing date** (day/month/year) 01 September 2000 (01.09.00)

1. The following indications appeared on record concerning:

[X] the applicant [X] the inventor [ ] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
FLOLOV, Gennadiy Apt. 812, 1411 du Fort Street Montréal, Québec H3H 2N7 Canada	UA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [X] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
FROLOV, Gennadiy Apt. 812, 1411 du Fort Street Montréal, Québec H3H 2N7 Canada	UA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer A. Karkachi
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

SWABEY OGILVY RENAULT
McGILL COLLEGE
RECEIVED

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

SWABEY OGILVY RENAULT
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

APR 2 0 2001
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

NOTIFICATION OF RECEIPT OF DEMAND BY COMPETENT INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

(PCT Rules 59.3(e) and 61.1(b), first sentence and Administrative Instructions, Section 601(a))

Date of mailing *(day/month/year)*	12.04.01
Applicant's or agent's file reference: 14836-1PCT TA	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA 00/01026	01/09/2000	03/09/1999

Applicant

MICROBRIDGE TECHNOLOGIES INC. et al.

1. The applicant is hereby **notified** that this International Preliminary Examining Authority considers the following date as the date of receipt of the demand for international preliminary examination of the international application:

23/03/2001

2. This date of receipt is:

- [x] the actual date of receipt of the demand by this Authority (Rule 61.1(b)).
- [ ] the actual date of receipt of the demand on behalf of this Authority (Rule 59.3(e)).
- [ ] the date on which this Authority has, in response to the invitation to correct defects in the demand (Form PCT/IPEA/404), received the required corrections.

3. [ ] **ATTENTION:** That date of receipt is **AFTER** the expiration of 19 months from the priority date. Consequently, the election(s) made in the demand does (do) not have the effect of postponing the entry into the national phase until 30 months from the priority date (or later in some Offices) (Article 39(1)). Therefore, the acts for entry into the national phase must be performed within 20 months from the priority date (or later in some Offices) (Article 22). For details, see the *PCT Applicant's Guide*, Volume II.

[ ] *(If applicable)* This notification confirms the information given by telephone, facsimile transmission or in person on:

4. Only where paragraph 3 applies, a copy of this notification has been sent to the International Bureau.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. (+49-89) 2399-0, Tx: 523656 epmu d Fax: (+49-89) 2399-4465	KENNEDY M B Tel. (+49-89) 2399-2976

EUROPÄISCHES PATENTAMT · EUROPEAN PATENT OFFICE · OFFICE EUROPÉEN DES BREVETS

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:
SWABEY OGILVY RENAULT
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

JAN. 29
FEB. 9 (PCT Rule 44.1)

DUE ON MAR 9 2002
Amend Claims

Applicant's or agent's file reference 14836-1PCT JA	Date of mailing (day/month/year) 09/01/2002
International application No. PCT/CA 00/ 01026	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant MICROBRIDGE TECHNOLOGIES INC.	International filing date (day/month/year) 01/09/2000

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Gregory Adam

Form PCT/ISA/220 (July 1998)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Abstract

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
14836-1PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/CA 00/01026	01/09/2000	03/09/1999
Applicant		
MICROBRIDGE TECHNOLOGIES INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [X] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established by this Authority to read as follows:

   SEVERAL GAS FLOW MEASURING DEVICES AND SIGNAL PROCESSING METHODS

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

ernational application No.
PCT/CA 00/01026

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

[redacted]ational Application No
PCT/CA 00/01026

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01F1/42 G01F1/684 G01F25/00 G01F1/696 A61B5/087
G01D1/02 H03M1/20 G01D3/032

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01F A61B G01D H03M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 629 862 A (SIEMENS AG) 21 December 1994 (1994-12-21) the whole document ---	1-5,8-10
A	US 5 186 056 A (LEW HYOK S) 16 February 1993 (1993-02-16) abstract ---	1
X	US 4 083 245 A (OSBORN JOHN J) 11 April 1978 (1978-04-11) the whole document --- -/--	11-14

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2001	09. 01. 02

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Boerrigter, H

Form PCT/ISA/210 (second sheet) (July 1992)

International Application No
PCT/CA 00/01026

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) & JP 10 122921 A (NIPPON KODEN CORP), 15 May 1998 (1998-05-15) abstract -& US 5 979 247 A (KIZAWA HIDETAKA) 9 November 1999 (1999-11-09) column 4, line 36 -column 6, line 26; figures 1,7	11-14
X	DE 42 38 149 A (MEISSNER & WURST) 19 May 1994 (1994-05-19) the whole document	11-14
A	US 4 083 244 A (AGAR JORAM ET AL) 11 April 1978 (1978-04-11) column 5, line 1 - line 14; figures 3,4	11-14
X	EP 0 037 259 A (VICTOR COMPANY OF JAPAN) 7 October 1981 (1981-10-07)	15-17
A	page 11, line 1 -page 15, line 8; figures 1-6	18
A	US 4 996 871 A (ROMANO PAUL) 5 March 1991 (1991-03-05) column 60, line 27 -column 62, line 58; figures 21,22	20-24
X	EP 0 890 828 A (EMERSON ELECTRIC CO) 13 January 1999 (1999-01-13) page 6, line 11 -page 9, line 17; figures 1-5	25-32
A	EP 0 068 604 A (WOLFENDALE PETER CALEB FREDERI) 5 January 1983 (1983-01-05) the whole document	25-32

2

Box III TEXT OF THE ABSTRACT (Continuation f item 5 of the first sheet)

A gas flow receiver has a non-symmetrical-flow-inducing diaphragm mounted in a flow tube and causes non-symmetrical flow in the flow tube with an accentuated higher pressure near an upstream orifice than would be sensed in a corresponding cross-section of the flow tube and an accentuated lower pressure near a downstream orifice. A gas flowmeter using thermoanemometer-type transducers receiving gas flow from the upstream orifice is made immune to vibration or acceleration by arranging a pair of the transducers parallel to one another with the gas flow passing serially through them, but in opposite directions. The transducer output is amplified by a noisy amplifier which injects a secondary signal prior to digital conversion using an ADC. The digital signal is averaged over a sampling period to obtain a sample having a level of precision greater than a minimum quantization value of the ADC.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10

   Gas flow transducer apparatus with immunity to vibration

2. Claims: 11-14

   Gas flow receiver with nonsymmetrical flow inducing diaphragm.

3. Claims: 15-19

   Method of digitization of an analogue signal with increased precision.

4. Claims: 20-24

   Signal processing method suppressing parasitic signals without degrading the frequency response.

5. Claims: 25-32

   Method of processing a non-linear transducer output signal to obtain a calibrated output signal.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 00/01026

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0629862	A	21-12-1994	DE	4320326 A1	22-12-1994
			EP	0629862 A1	21-12-1994
			JP	7027779 A	31-01-1995
US 5186056	A	16-02-1993	US	5095760 A	17-03-1992
US 4083245	A	11-04-1978	CA	1069342 A1	08-01-1980
			DE	2723337 A1	02-02-1978
			FR	2360063 A1	24-02-1978
			JP	1331973 C	14-08-1986
			JP	53016658 A	15-02-1978
			JP	61000567 B	09-01-1986
			SE	432023 B	12-03-1984
			SE	7705919 A	30-01-1978
JP 10122921	A	15-05-1998	FI	974019 A	23-04-1998
			US	5979247 A	09-11-1999
DE 4238149	A	19-05-1994	DE	4238149 A1	19-05-1994
US 4083244	A	11-04-1978	GB	1512290 A	01-06-1978
			DE	2653359 A1	26-05-1977
			JP	1029486 C	22-01-1981
			JP	52065485 A	30-05-1977
			JP	55020193 B	31-05-1980
EP 0037259	A	07-10-1981	JP	56136027 A	23-10-1981
			EP	0037259 A1	07-10-1981
US 4996871	A	05-03-1991	US	4934196 A	19-06-1990
			AU	637112 B2	20-05-1993
			AU	5812890 A	07-01-1991
			BR	9007415 A	16-06-1992
			CA	2053923 A1	03-12-1990
			CA	2157516 A1	13-12-1990
			DE	69017020 D1	23-03-1995
			DE	69017020 T2	14-09-1995
			EP	0474743 A1	18-03-1992
			JP	2799243 B2	17-09-1998
			JP	4505506 T	24-09-1992
			WO	9015309 A1	13-12-1990
EP 0890828	A	13-01-1999	US	5944048 A	31-08-1999
			EP	0890828 A1	13-01-1999
			JP	3000352 B2	17-01-2000
			JP	11094604 A	09-04-1999
			US	5975126 A	02-11-1999
EP 0068604	A	05-01-1983	GB	2097536 A	03-11-1982
			EP	0068604 A2	05-01-1983

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

ANGLEHART, James
Swabey Ogilvy Renault
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

Date of mailing (day/month/year) 05 July 2001 (05.07.01)	
Applicant's or agent's file reference 14836-1PCT	**IMPORTANT NOTIFICATION**
International application No. PCT/CA00/01026	**International filing date** (day/month/year) 01 September 2000 (01.09.00)

1. The following indications appeared on record concerning:

[X] the applicant [X] the inventor [ ] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
FLOLOV, Gennadiy Apt. 812, 1411 du Fort Street Montréal, Québec H3H 2N7 Canada	UA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [X] the name [ ] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
FROLOV, Gennadiy Apt. 812, 1411 du Fort Street Montréal, Québec H3H 2N7 Canada	UA	CA
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[X] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer A. Karkachi
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/306 (March 1994)

004131536

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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International Bureau

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15 March 2001 (15.03.2001)

PCT

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WO 01/18496 A2

(51) International Patent Classification[7]: G01F 1/00

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(22) International Filing Date:
1 September 2000 (01.09.2000)

(25) Filing Language: English

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(30) Priority Data:

60/152,461	3 September 1999 (03.09.1999)	US
60/152,460	3 September 1999 (03.09.1999)	US
60/152,487	3 September 1999 (03.09.1999)	US
60/152,464	3 September 1999 (03.09.1999)	US

(71) Applicant *(for all designated States except US)*: **MICRO-BRIDGE TECHNOLOGIES INC.** [CA/CA]; 310 Elm Avenue, Westmount, Québec H3Z 1Z5 (CA).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GRUDIN, Oleg** [UA/CA]; Apt. 2404, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA). **GENDIN, Alexander** [UA/CA]; Apt. 812, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA). **FLOLOV, Gennadiy** [UA/CA]; Apt. 812, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA).

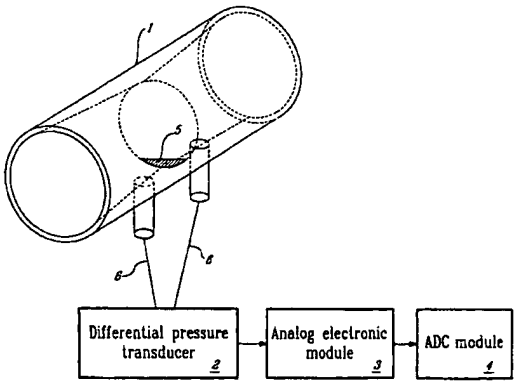
(74) Agents: **ANGLEHART, James** et al.; Swabey Ogilvy Renault, 1981 McGill College Avenue, Suite 1600, Montréal, Québec H3A 2Y3 (CA).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: GAS FLOW MEASURING APPARATUS AND SIGNAL PROCESSING METHODS APPLICABLE THERETO



(57) Abstract: A gas flow receiver has a non-symmetrical-flow-inducing diaphragm mounted in a flow tube and causes non-symmetrical flow in the flow tube with an accentuated higher pressure near an upstream orifice than would be sensed in a corresponding cross-section of the flow tube and an accentuated lower pressure near a downstream orifice. A gas flowmeter using thermoanemometer-type transducers receiving gas flow from the upstream orifice is made immune to vibration or acceleration, for example, by arranging a pair of the transducers parallel to one another with the gas flow passing serially through them, but in opposite directions. The resulting transducer signals processed to cancel the effect of the vibration or acceleration. The transducer output is amplified by a noisy amplifier which injects a secondary signal prior to digital conversion using an ADC. The digital signal is averaged over a sampling period to obtain a sample having a level of precision greater than a minimum quantization value of the ADC. The sampling period is varied as a function of the transducer's analog signal amplitude, such that the sampling period is longer for lower amplitude values and is shorter for higher amplitude values. The sampling period variation provides signal filtering. Since the flowmeter has a non-linear response, a calibrated output signal representing flow is obtained by recording samples under a number of calibrated flows and obtaining an analytical solution for the non-linear function, using the analytical solution to obtain calibrated values for all sample values, and, in operation, looking up a calibrated value corresponding to a sample value.

WO 01/18496 A2

Published:

— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
ANGLEHART, James
Swabey Ogilvy Renault
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

Date of mailing (day/month/year) 15 March 2001 (15.03.01)	
Applicant's or agent's file reference 14836-1PCT	**IMPORTANT NOTICE**

International application No.	**International filing date** (day/month/year)	**Priority date** (day/month/year)
PCT/CA00/01026	01 September 2000 (01.09.00)	03 September 1999 (03.09.99)

Applicant
MICROBRIDGE TECHNOLOGIES INC. et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,ES, FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK, MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   15 March 2001 (15.03.01) under No. WO 01/18496

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
SWABEY OGILVY RENAULT
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

INVITATION TO PAY ADDITIONAL FEES

(PCT Article 17(3)(a) and Rule 40.1)

DUE ON MAY 14 2001
PAYMENT DUE

Date of mailing *(day/month/year)*	03/04/2001
Applicant's or agent's file reference: 14836-1PCT	**PAYMENT DUE** within 45 ~~months~~/days from the above date of mailing
International application No.: PCT/CA 00/01026	International filing date *(day/month/year)*: 01/09/2000

Applicant

MICROBRIDGE TECHNOLOGIES INC.

1. This International Searching Authority

(i) considers that there are 05 *(number of)* inventions claimed in the international application covered by the claims indicated ~~below~~/on the extra sheet:

and it considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated ~~below~~/on the extra sheet:

(ii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:
1-10

(iii) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid

2. The applicant is hereby **invited,** within the time limit indicated above, to pay the amount indicated below:

DEM 1.848,26	x	04	=	DEM 7.393,04
Fee per additional invention		number of additional inventions		total amount of additional fees
Or, EUR 945,00	x	04	=	EUR 3.780,00

The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest,** i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive.

3. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Gregory Adam

Form PCT/ISA/206 (July 1992)

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PCT/CA 00/01026

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
1-10
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 629 862 A (SIEMENS AG) 21 December 1994 (1994-12-21) the whole document	1-5,8-10
A	US 5 186 056 A (LEW HYOK S) 16 February 1993 (1993-02-16) abstract	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/CA 00/01026

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10

   Gas flow transducer apparatus with immunity to vibration

2. Claims: 11-14

   Gas flow receiver with nonsymmetrical flow inducing diaphragm.

3. Claims: 15-19

   Method of digitization of an analogue signal with increased precision.

4. Claims: 20-24

   Signal processing method suppressing parasitic signals without degrading the frequency response.

5. Claims: 25-32

   Method of processing a non-linear transducer output signal to obtain a calibrated output signal.

The reasons for the non-unity are as follows:

Independent claim 1 (1st invention) describes a gas flow transducer which is made immune for vibration or acceleration, by using two sensors which measure the flow differently. Combining the two signals of the two sensors gives an output in which the perturbation caused by acceleration or vibration is substantially cancelled. The apparent Special Technical Feature (STF) is the use of two sensors which measure the same flow, but in opposite directions. The problem to be solved by this STF (problem 1) can be seen as improving the immunity of a flowmeter to vibrations or shocks (page 6, line 13-15 and page 7, item 2).

Independent claim 11 (2nd invention) describes a gas flow receiver, measuring a pressure difference over a diaphragm in an orifice placed in a flow tube. The shape of the diaphragm is non-symmetrical, so that it creates a non-symmetrical flow downstream of the orifice, causing a higher pressure difference. The apparent Special Technical Feature (STF) is the use of a non-symmetrical diaphragm. The problem to be solved by this STF (problem 2) can be seen as increasing the effectiveness of the gas flow receiver (page 6, line 9-10 and page 6, item 1).

Independent claim 15 (3rd invention) describes a method for increasing the precision of the digitization of an analogue signal. The apparent Special Technical Feature (STF) is the use of a signal processing technique where a secondary signal is added to the analogue signal. The problem to be solved by this STF (problem 3) can be seen as

improving the resolution which is otherwise limited by quantization noise (page 6, line 16 and page 9, item 3).

Independent claim 20 (4th invention) describes a method of filtering a signal, by averaging over a period which depends on the amplitude of the signal. The apparent Special Technical Feature (STF) is the use of an averaging period which is dependent on the signal amplitude.
The problem to be solved by this STF can be seen as suppressing parasitic signals without degrading the frequency response of the device (page 6, line 13-15 and page 11, item 4).

Independent claim 25 (5th invention) describes a method of processing an output signal which is a non-linear function of a physical parameter, by converting a number of calibration results into an analytical solution, which solution is subsequently used to obtain a calibrated output signal. The apparent Special Technical Feature is the use of a number of calibration results to obtain an analytical solution. The problem to be solved by this STF (problem 4) can be seen as obtaining linearization of a gas flowmeter (page 6, line 17 and page 11, item 5).

A comparison of problem 1 with the problems 2, 3, 4 and 5, all seen in the light of the description and the drawings, indicates that there is no technical correspondence between these problems, nor do they show any corresponding technical effect, so that the Special Technical Features of inventions 2, 3, 4 and 5 fail to demonstrate a correspondence with the Special Technical Feature of invention 1 as required by Rule 13.1 and 13.2 PCT.

Patent Family Annex

Information on patent family members

International Application No
PCT/CA 00/01026

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0629862	A	21-12-1994	DE 4320326 A		22-12-1994
			JP 7027779 A		31-01-1995
US 5186056	A	16-02-1993	US 5095760 A		17-03-1992

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

To:

SWABEY OGILVY RENAULT
McGILL COLLEGE
RECEIVED
JUN 1 2001

ANGLEHART, James
Swabey Ogilvy Renault
1981 McGill College Avenue
Suite 1600
Montréal, Québec H3A 2Y3
CANADA

Date of mailing (day/month/year) 16 May 2001 (16.05.01)	
Applicant's or agent's file reference 14836-1PCT	**IMPORTANT INFORMATION**

International application No.	**International filing date** (day/month/year)	**Priority date** (day/month/year)
PCT/CA00/01026	01 September 2000 (01.09.00)	03 September 1999 (03.09.99)

Applicant
MICROBRIDGE TECHNOLOGIES INC. et al

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

   EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
   National :AU,BG,CA,CN,CZ,DE,IL,JP,KP,KR,MN,NO,NZ,PL,RO,RU,SE,SK,US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

   AP :GH,GM,KE,LS,MW,MZ,SD,SL,SZ,TZ,UG,ZW
   EA :AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
   OA :BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG
   National :AE,AG,AL,AM,AT,AZ,BA,BB,BR,BY,BZ,CH,CR,CU,DK,DM,DZ,EE,ES,FI,GB,
   GD,GE,GH,GM,HR,HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MW,
   MX,MZ,PT,SD,SG,SI,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,ZA,ZW

3. The applicant is reminded that he must enter the "national phase" **before the expiration of 30 months from the priority date** before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing , if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

   Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

   The entry into the European regional phase is postponed **until 31 months from the priority date** for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:
Claudio Borton

Telephone No. (41-22) 338.83.38

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

10/069876

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 March 2001 (15.03.2001)

PCT

(10) International Publication Number
WO 01/018496 A3

(51) International Patent Classification[7]: G01F 1/42, 1/684, 25/00, 1/696, A61B 5/087, G01D 1/02, H03M 1/20, G01D 3/032

(21) International Application Number: PCT/CA00/01026

(22) International Filing Date:
1 September 2000 (01.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **MICRO-BRIDGE TECHNOLOGIES INC.** [CA/CA]; 310 Elm Avenue, Westmount, Québec H3Z 1Z5 (CA).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GRUDIN, Oleg** [UA/CA]; Apt. 2404, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA). **GENDIN, Alexander** [UA/CA]; Apt. 812, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA). **FROLOV, Gennadiy** [UA/CA]; Apt. 812, 1411 du Fort Street, Montréal, Québec H3H 2N7 (CA).

(74) Agents: **ANGLEHART, James** et al.; Swabey Ogilvy Renault, 1981 McGill College Avenue, Suite 1600, Montréal, Québec H3A 2Y3 (CA).

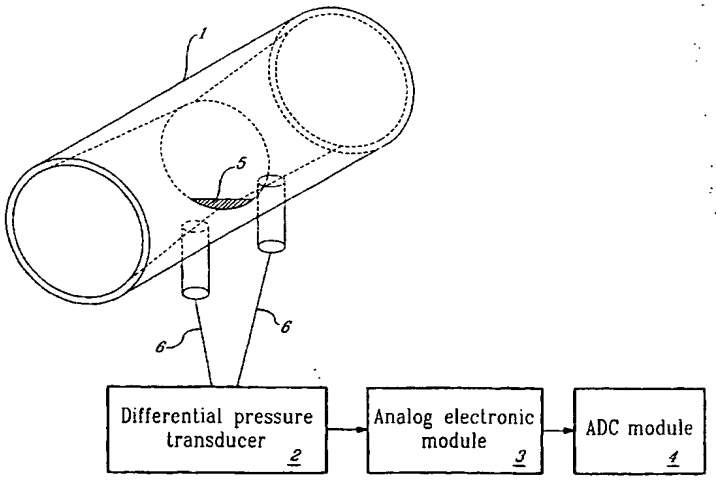
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*
— *upon request of the applicant, before the expiration of the time limit referred to in Article 21(2)(a)*

[Continued on next page]

(54) Title: SEVERAL GAS FLOW MEASURING DEVICES AND SIGNAL PROCESSING METHODS



(57) Abstract: A gas flow receiver has a non-symmetrical-flow-inducing diaphragm mounted in a flow tube and causes non-symmetrical flow in the flow tube with an accentuated higher pressure near an upstream orifice than would be sensed in a corresponding cross-section of the flow tube and an accentuated lower pressure near a downstream orifice. A gas flowmeter using thermoanemometer-type transducers receiving gas flow from the upstream orifice is made immune to vibration or acceleration by arranging a pair of the transducers parallel to one another with the gas flow passing serially through them, but in opposite directions. The transducer output is amplified by a noisy amplifier which injects a secondary signal prior to digital conversion using an ADC. The digital signal is averaged over a sampling period to obtain a sample having a level of precision greater than a minimum quantization value of the ADC.

WO 01/018496 A3

(88) Date of publication of the international search report:
12 September 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Int nal Application No
PCT/CA 00/01026

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01F1/42 G01F1/684 G01F25/00 G01F1/696 A61B5/087
G01D1/02 H03M1/20 G01D3/032

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01F A61B G01D H03M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 629 862 A (SIEMENS AG) 21 December 1994 (1994-12-21) the whole document ---	1-5,8-10
A	US 5 186 056 A (LEW HYOK S) 16 February 1993 (1993-02-16) abstract ---	1
X	US 4 083 245 A (OSBORN JOHN J) 11 April 1978 (1978-04-11) the whole document ---	11-14
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2001	09. 01. 02

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Boerrigter, H

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) & JP 10 122921 A (NIPPON KODEN CORP), 15 May 1998 (1998-05-15) abstract -& US 5 979 247 A (KIZAWA HIDETAKA) 9 November 1999 (1999-11-09) column 4, line 36 -column 6, line 26; figures 1,7	11-14
X	DE 42 38 149 A (MEISSNER & WURST) 19 May 1994 (1994-05-19) the whole document	11-14
A	US 4 083 244 A (AGAR JORAM ET AL) 11 April 1978 (1978-04-11) column 5, line 1 - line 14; figures 3,4	11-14
X	EP 0 037 259 A (VICTOR COMPANY OF JAPAN) 7 October 1981 (1981-10-07)	15-17
A	page 11, line 1 -page 15, line 8; figures 1-6	18
A	US 4 996 871 A (ROMANO PAUL) 5 March 1991 (1991-03-05) column 60, line 27 -column 62, line 58; figures 21,22	20-24
X	EP 0 890 828 A (EMERSON ELECTRIC CO) 13 January 1999 (1999-01-13) page 6, line 11 -page 9, line 17; figures 1-5	25-32
A	EP 0 068 604 A (WOLFENDALE PETER CALEB FREDERI) 5 January 1983 (1983-01-05) the whole document	25-32

INTERNATIONAL SEARCH REPORT

national application No.
PCT/CA 00/01026

Box I Observations where certain claims were f und unsearchable (C ntinuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10

   Gas flow transducer apparatus with immunity to vibration

2. Claims: 11-14

   Gas flow receiver with nonsymmetrical flow inducing diaphragm.

3. Claims: 15-19

   Method of digitization of an analogue signal with increased precision.

4. Claims: 20-24

   Signal processing method suppressing parasitic signals without degrading the frequency response.

5. Claims: 25-32

   Method of processing a non-linear transducer output signal to obtain a calibrated output signal.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0629862 A	21-12-1994	DE 4320326 A1	22-12-1994
		EP 0629862 A1	21-12-1994
		JP 7027779 A	31-01-1995
US 5186056 A	16-02-1993	US 5095760 A	17-03-1992
US 4083245 A	11-04-1978	CA 1069342 A1	08-01-1980
		DE 2723337 A1	02-02-1978
		FR 2360063 A1	24-02-1978
		JP 1331973 C	14-08-1986
		JP 53016658 A	15-02-1978
		JP 61000567 B	09-01-1986
		SE 432023 B	12-03-1984
		SE 7705919 A	30-01-1978
JP 10122921 A	15-05-1998	FI 974019 A	23-04-1998
		US 5979247 A	09-11-1999
DE 4238149 A	19-05-1994	DE 4238149 A1	19-05-1994
US 4083244 A	11-04-1978	GB 1512290 A	01-06-1978
		DE 2653359 A1	26-05-1977
		JP 1029486 C	22-01-1981
		JP 52065485 A	30-05-1977
		JP 55020193 B	31-05-1980
EP 0037259 A	07-10-1981	JP 56136027 A	23-10-1981
		EP 0037259 A1	07-10-1981
US 4996871 A	05-03-1991	US 4934196 A	19-06-1990
		AU 637112 B2	20-05-1993
		AU 5812890 A	07-01-1991
		BR 9007415 A	16-06-1992
		CA 2053923 A1	03-12-1990
		CA 2157516 A1	13-12-1990
		DE 69017020 D1	23-03-1995
		DE 69017020 T2	14-09-1995
		EP 0474743 A1	18-03-1992
		JP 2799243 B2	17-09-1998
		JP 4505506 T	24-09-1992
		WO 9015309 A1	13-12-1990
EP 0890828 A	13-01-1999	US 5944048 A	31-08-1999
		EP 0890828 A1	13-01-1999
		JP 3000352 B2	17-01-2000
		JP 11094604 A	09-04-1999
		US 5975126 A	02-11-1999
EP 0068604 A	05-01-1983	GB 2097536 A	03-11-1982
		EP 0068604 A2	05-01-1983

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
14836-1PCT		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/CA 00/01026	01/09/2000	03/09/1999
Applicant		
MICROBRIDGE TECHNOLOGIES INC.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language,** the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [X] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established by this Authority to read as follows:

   SEVERAL GAS FLOW MEASURING DEVICES AND SIGNAL PROCESSING METHODS

5. With regard to the **abstract,**

   [ ] the text is approved as submitted by the applicant.

   [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

   [X] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01026

A. CLASSIFICATION OF SUBJEGT MATTER
IPC 7 G01F1/42 G01F1/684 G01F25/00 G01F1/696 - A61B5/087
G01D1/02 H03M1/20 G01D3/032

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01F A61B G01D H03M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 629 862 A (SIEMENS AG) 21 December 1994 (1994-12-21) the whole document ---	1-5,8-10
A	US 5 186 056 A (LEW HYOK S) 16 February 1993 (1993-02-16) abstract ---	1
X	US 4 083 245 A (OSBORN JOHN J) 11 April 1978 (1978-04-11) the whole document ---	11-14
	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 December 2001	09. 01. 02

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Boerrigter, H

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 00/01026

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) & JP 10 122921 A (NIPPON KODEN CORP), 15 May 1998 (1998-05-15) abstract -& US 5 979 247 A (KIZAWA HIDETAKA) 9 November 1999 (1999-11-09) column 4, line 36 -column 6, line 26; figures 1,7	11-14
X	DE 42 38 149 A (MEISSNER & WURST) 19 May 1994 (1994-05-19) the whole document	11-14
A	US 4 083 244 A (AGAR JORAM ET AL) 11 April 1978 (1978-04-11) column 5, line 1 - line 14; figures 3,4	11-14
X	EP 0 037 259 A (VICTOR COMPANY OF JAPAN) 7 October 1981 (1981-10-07)	15-17
A	page 11, line 1 -page 15, line 8; figures 1-6	18
A	US 4 996 871 A (ROMANO PAUL) 5 March 1991 (1991-03-05) column 60, line 27 -column 62, line 58; figures 21,22	20-24
X	EP 0 890 828 A (EMERSON ELECTRIC CO) 13 January 1999 (1999-01-13) page 6, line 11 -page 9, line 17; figures 1-5	25-32
A	EP 0 068 604 A (WOLFENDALE PETER CALEB FREDERI) 5 January 1983 (1983-01-05) the whole document	25-32

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA 00/01026

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

International application No.
PCT/CA 00/01026

INTERNATIONAL SEARCH REPORT

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

A gas flow receiver has a non-symmetrical-flow-inducing diaphragm mounted in a flow tube and causes non-symmetrical flow in the flow tube with an accentuated higher pressure near an upstream orifice than would be sensed in a corresponding cross-section of the flow tube and an accentuated lower pressure near a downstream orifice. A gas flowmeter using thermoanemometer-type transducers receiving gas flow from the upstream orifice is made immune to vibration or acceleration by arranging a pair of the transducers parallel to one another with the gas flow passing serially through them, but in opposite directions. The transducer output is amplified by a noisy amplifier which injects a secondary signal prior to digital conversion using an ADC. The digital signal is averaged over a sampling period to obtain a sample having a level of precision greater than a minimum quantization value of the ADC.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-10

   Gas flow transducer apparatus with immunity to vibration

2. Claims: 11-14

   Gas flow receiver with nonsymmetrical flow inducing diaphragm.

3. Claims: 15-19

   Method of digitization of an analogue signal with increased precision.

4. Claims: 20-24

   Signal processing method suppressing parasitic signals without degrading the frequency response.

5. Claims: 25-32

   Method of processing a non-linear transducer output signal to obtain a calibrated output signal.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 00/01026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0629862 A	21-12-1994	DE 4320326 A1	22-12-1994
		EP 0629862 A1	21-12-1994
		JP 7027779 A	31-01-1995
US 5186056 A	16-02-1993	US 5095760 A	17-03-1992
US 4083245 A	11-04-1978	CA 1069342 A1	08-01-1980
		DE 2723337 A1	02-02-1978
		FR 2360063 A1	24-02-1978
		JP 1331973 C	14-08-1986
		JP 53016658 A	15-02-1978
		JP 61000567 B	09-01-1986
		SE 432023 B	12-03-1984
		SE 7705919 A	30-01-1978
JP 10122921 A	15-05-1998	FI 974019 A	23-04-1998
		US 5979247 A	09-11-1999
DE 4238149 A	19-05-1994	DE 4238149 A1	19-05-1994
US 4083244 A	11-04-1978	GB 1512290 A	01-06-1978
		DE 2653359 A1	26-05-1977
		JP 1029486 C	22-01-1981
		JP 52065485 A	30-05-1977
		JP 55020193 B	31-05-1980
EP 0037259 A	07-10-1981	JP 56136027 A	23-10-1981
		EP 0037259 A1	07-10-1981
US 4996871 A	05-03-1991	US 4934196 A	19-06-1990
		AU 637112 B2	20-05-1993
		AU 5812890 A	07-01-1991
		BR 9007415 A	16-06-1992
		CA 2053923 A1	03-12-1990
		CA 2157516 A1	13-12-1990
		DE 69017020 D1	23-03-1995
		DE 69017020 T2	14-09-1995
		EP 0474743 A1	18-03-1992
		JP 2799243 B2	17-09-1998
		JP 4505506 T	24-09-1992
		WO 9015309 A1	13-12-1990
EP 0890828 A	13-01-1999	US 5944048 A	31-08-1999
		EP 0890828 A1	13-01-1999
		JP 3000352 B2	17-01-2000
		JP 11094604 A	09-04-1999
		US 5975126 A	02-11-1999
EP 0068604 A	05-01-1983	GB 2097536 A	03-11-1982
		EP 0068604 A2	05-01-1983

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
14836-1PCT		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CA00/01026	01/09/2000	03/09/1999
International Patent Classification (IPC) or national classification and IPC G01F1/00		
Applicant MICROBRIDGE TECHNOLOGIES INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☒ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
23/03/2001	21.10.2002
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Politsch, E Telephone No. +49 89 2399 8455

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA00/01026

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, pages:

1-27	as originally filed			

Claims, No.:

2-32	as received on	14/03/2002	with letter of	04/03/2002
1	as received on	10/09/2002	with letter of	10/09/2002

Drawings, sheets:

1/16-16/16	as originally filed	

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☒ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☐ all parts.

   ☒ the parts relating to claims Nos. 1-10, 22-32.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-10, 22-32
	No:	Claims

Inventive step (IS)	Yes:	Claims	1-10
	No:	Claims	22-32
Industrial applicability (IA)	Yes:	Claims	1-10, 22-32
	No:	Claims	

2. Citations and explanations
see separate sheet

1. CITED DOCUMENTS

The following documents cited in the International Search Report are referred to in this report:

D1: EP-A-0 629 862 (SIEMENS AG) 21 December 1994 (1994-12-21)

D2: EP-A-0 890 828 (EMERSON ELECTRIC CO) 13 January 1999 (1999-01-13)

D3: US-A-4 083 245 (OSBORN JOHN J) 11 April 1978 (1978-04-11)

D4: PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) & JP 10 122921 A (NIPPON KODEN CORP), 15 May 1998 (1998-05-15) -& US 5 979 247 A (KIZAWA HIDETAKA) 9 November 1999 (1999-11-09)

D5: DE 42 38 149 A (MEISSNER & WURST) 19 May 1994 (1994-05-19)

2. REMARKS ON IV. UNITY OF INVENTION

Claims 1-10 on the one hand and claims 22-32 on the other hand relate to different inventions:

1. Claims 1-10:
   gas flow transducer immune to vibration or acceleration;
2. Claims 22-32:
   method of processing a non-linear gas flow transducer output signal to obtain a calibrated output signal

They are not so linked as to form a single general inventive concept (Rule 13.1 PCT) for the following reasons:

Independent claim 1 describes a gas flow transducer which is made immune to vibration or acceleration (perturbation) by using at least two gas flow sensors which are connected to gas flow passages such that the perturbation component and the gas flow is measured differently. The signals of the at least two sensors are combined to cancel out said perturbation. The special technical feature linking the first group of inventions (claims 1-10) is the use of at least two sensors which measure different components of the gas flow and perturbation.

The problem to be solved by this special technical feature can be seen as improving the immunity of a flowmeter to vibrations or shocks.

Independent claim 22 describes a method of processing a gas flow transducer output signal which is a non-linear function of a physical parameter by converting a number of calibration results into an analytical solution, which solution is subsequently used to obtain a calibrated output signal. The special technical feature linking the fourth group of inventions (claims 22-32) is the use of a number of calibration results to obtain an analytical solution of the form

$$F(V)=\sum_{i=1}^{N} A_i V^{\frac{i}{\alpha_i}};\ N\geq 3.$$

The problem to be solved by this special technical feature can be seen as obtaining linearization of a gas flowmeter.

3. REMARKS ON V. REASONED STATEMENT UNDER RULE 66.2(a)(ii) WITH REGARD TO NOVELTY, INVENTIVE STEP OR INDUSTRIAL APPLICABILITY

The subject-matter of claims 1-10 is novel and inventive in the sense of Articles 33(2) and 33(3) PCT.
The subject-matter of claims 22-32 lacks an inventive step in the sense of Article 33(3) PCT.

3.1 Claim 1

3.1.1 Document D1, which concerns a flow meter for fluids, discloses (see Figs. 1, 2) a gas flow transducer apparatus with immunity to vibration or acceleration, the apparatus comprising: a plurality of gas flow transducer elements (2, 4 and 6, 8) each sensitive to vibration or acceleration in at least one direction and generating an output signal proportional to gas flow and to a perturbation component resulting from said vibration or acceleration, said elements being arranged on a common support (membrane 32; the transducer elements consisting of resistors 2, 4 and 6, 8, respectively, are, of course, sensitive to vibration or acceleration and their output signal, i.e., their resistance, is propor-

tional to gas flow and to the vibration or acceleration induced perturbation component); a plurality of gas flow passages (as formed by inlet orifice 12, cavity 11, and second orifices 14) leading gas flow from an inlet (15, 12) to an outlet (14) through at least one of said elements (2, 4 and 6, 8); said elements being arranged on said common support and *said elements are arranged such that said gas flow and said perturbation component act in different directions at different flow transducer elements* (e.g. an acceleration component perpendicular to axis M and symmetry plane PS is registered with opposite sign by elements 2, 4 and 6, 8); and circuitry (see Fig. 3) receiving said output signal of each of said elements and outputting a vibration or acceleration immune output signal corresponding to said gas flow with said perturbation component substantially cancelled (the measured signal U_M without acceleration component or U_M' with acceleration component is, according to col. 8, lines 35-38, proportional to

$$U_M=\frac{R_4R_8-R_2R_6}{(R_2+R_4)(R_6+R_8)}U=\frac{(R_4+\Delta R)(R_8-\Delta R)-(R_2-\Delta R)(R_6+\Delta R)}{(R_2-\Delta R+R_4+\Delta R)(R_6+\Delta R+R_8-\Delta R)}U=U_M';$$

if the resistance changes caused by the acceleration component are written as $R_2'=R_2-\Delta R$; $R_4'=R_4+\Delta R$; $R_6'=R_6+\Delta R$; $R_8'=R_8-\Delta R$; Hence, the flowmeter depicted in Figs. 1, 2, 3 of document D1 obviously cancels out perturbation components in considered direction).

NB: (a) the original wording '*and connected to said passages such that at least one of said perturbation component and said gas flow is measured differently by said elements*' is unclear; however, it is clear from the description and drawings that said elements are arranged such that *flow and acceleration act in different directions at different flow sensitive elements*, cf. description, p. 7, lines 28-30.

(b) the originally used wording '*wherein said gas flow is always in a single, well-defined direction at one time*' does not make clear that the absolute value of the direction is constant and predetermined by the channels. Support for the clarified formulation (see 3.1.2) can be found in Figs. 10-14 and e.g. p. 4, lines 16-18.

3.1.2 The subject-matter of claim 1 differs from that of D1 in that *the gas flow passages are straight channels with constant cross-section and each gas flow passage constrains the gas flow to a single, well-defined direction given by the channel's longitudinal axis at one time.*

3.1.3 The distinguishing feature provides with respect to D1 an alternative design of a vibration-immune flow meter with enhanced geometrical variability, which may be regarded as the problem solved by the subject-matter of claim 1.

3.1.4 The proposed arrangement with uniaxially resolving gas flow transducers is neither suggested nor rendered obvious by the presently available prior art. In particular, document D1, although being immune to vibration in a certain range (as explicated above), does not mention that characteristic. The skilled person would therefore not contemplate constructional variations of the semi-circular transducer arrangement disclosed there in order to improve or alter that characteristic.
Hence, the subject-matter of claim 1 and consequently also claims 2 to 10, which define additional features, involves an inventive step.

3.2 Claim 22

3.2.1 Document D2 discloses

a method of measuring gas flow using a thermoanemometer-type transducer (see abstract; p. 4, l. 57 - p. 5, l. 6, Fig. 3) having an output signal that is non-linear with respect to a physical parameter being measured (Fig. 4; p. 5, l. 41-45) to obtain a calibrated output signal representing the physical parameter on a given scale, the method comprising:
subjecting said flow tube to a number of calibrated gas flow conditions (Fig. 5; p. 6. l. 32-35);
recording a value of said output under each of said conditions (Table 1);
obtaining an analytical solution for a non-linear function relating said value to said gas flow (p. 7, l. 47-56), said solution being expressed as:

$$y=\sum_{i=0}^{4} A_i x^i$$

where x is the transducer output signal; parameters A_i are coefficients determined from said recorded values (by LU decomposition, see p. 7, l. 50-51); and determining said calibrated output signal for said transducer output signal using said analytical solution.

NB: The exemplarily given function in document D2 is a special case, viz a specific disclosure of the generic function $F(V)=\sum_{i=1}^{N} A_i V^{\frac{i}{\alpha_i}}$ according to claim 22 of the present application. Hence, since the specific disclosure of document D2 is covered by claim 22 of the present application, no delimitation against D2 is possible with regard to this feature.

3.2.2 The subject-matter of claim 22 differs from that of D2 in that a flow tube is provided having a non-symmetrical-flow-inducing diaphragm mounted in said flow tube, and causing non-symmetrical flow in said flow tube with an accentuated higher pressure near a first portion of said diaphragm than would be sensed in a corresponding cross- section of said flow tube and an accentuated lower pressure near a second portion of said diaphragm than would be sensed in a corresponding cross-section of said flow tube, said transducer being in fluid communication with said first and second portions.

3.2.3 The distinguishing feature provides with respect to the closest prior art an alternative arrangement to induce a pressure drop, which may be regarded as the problem solved by the subject-matter of claim 1.

3.2.4 The person skilled in the art knows various possible alternatives to induce a pressure drop required for the bypass flow measurement. He would therefore, without the exercise of inventive skill, take into consideration the arrangements shown in Fig. 1 of D1, the Fig. of D4, or Figs. 2, 3 of D5. All these documents describe certain advantages over symmetrical diaphragm arrangements. Therefore, the according adaptation of the flowmeter shown in Fig. 2 of D2 would be an obvious possibility, thereby arriving at the subject-matter of claim 22 of the present application.
Consequently, claim 22 lacks an inventive step.

It must furthermore be mentioned that the skilled person trying to further improve one of the flow meters according to D3, D4 or D5 would consult document D2 for the realisation of this improvement. E.g., Fig. 3 of document D3 illustrates that the flowmeter described therein has still no exactly linear response. Attempts to further optimize the response would lead the skilled person to document D2. The applicability of the calibration method described in D2 to the flowmeter of D3 is obvious, thereby again arriving at the subject-matter of claim 22.
NB: The use of a hinged flap as flow-inducing diaphragm (which is clearly a non-symmetrical flow-inducing diaphragm) in D3 or D4 does not constitute a essential difference compared to a rigid diaphragm; moreover, this difference is not defined in claim 22.

3.3 Claims 23, 24

For N=8, A_1=A_3=A_5=A_7=0, α_2=α_4=α_6=α_8=2, the equation in line 54 on page 7 of D2 is still a special case of the equation according to claim 23. If N is chosen great enough, the equation implied by claim 24 can also approximate said equation of D2 arbitrarily precise.

3.4 Claims 25, 26

Tables 1, 2, 3 of document D2 are used for the same purpose, as described in the related passages of the description of D2. The analytical solution is used for the whole range covered by the flowmeter disclosed therein.

3.5 Claim 27

In claim 27, division of the analytical function into subranges is defined. This division, however, comes within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved (e.g. simple linear functions in the distinct subranges) can readily be foreseen. Consequently, the subject-matter of claim 27 also lacks an inventive step.

3.6 Claim 28

Using a flow transducer with a square transfer function does not add anything inventive to the subject-matter of the claims to which reference is made by claim 28.

3.7 Claims 29, 30

These claims define arrangements as disclosed in D3-D4, for instance. Hence, nothing inventive is added.

3.8 Claim 31

This claim attempts to define a feature of the invention by a result to be achieved. However, this is only allowable if said feature of the invention can only be defined in such terms, which is apparently not the case. Moreover, the wording 'generate maximum accentuated pressure for its size' is altogether unclear. It is not confutable that the claimed features are also present in the flow meters according to documents D3-D5. Hence, nothing inventive is added by this claim.

3.9 Claim 32

The flowmeter disclosed in document D3 has a smaller cross-section (adjacent to orifices 35 and 37) compared to tubes 13 and the tapering in the proximity of such a cross-section is similarly, namely equally, tapered.

Even if the geometry shown in Figs. 1-3 of the present application had been defined properly, it would appear to be a constructional detail without inventive merit over the prior art.

1. A gas flow transducer apparatus with immunity to vibration or acceleration, the apparatus comprising:

a plurality of gas flow transducer elements each sensitive to vibration or acceleration in at least one direction and generating an output signal proportional to gas flow and to a perturbation component resulting from said vibration or acceleration, said elements being arranged on a common support;

a plurality of gas flow passages with constant cross-section leading gas flow from an inlet to an outlet through at least one of said elements, wherein said gas flow is always in a single, well-defined direction at one time;

said elements being arranged on said common support and connected to said passages such that at least one of said perturbation component and said gas flow is measured differently by said elements; and

circuitry receiving said output signal of each of said elements and outputting a vibration or acceleration immune output signal corresponding to said gas flow with said perturbation component substantially cancelled.

2. The apparatus as claimed in claim 1, wherein said gas flow passages cause said gas flow to be equal through said elements.

3. The apparatus as claimed in claim 2, wherein said gas flow is split between said elements.

4. The apparatus as claimed in claim 2, wherein said gas flow passes serially through said elements.

CLAIMS

1. A gas flow transducer apparatus with immunity to vibration or acceleration, the apparatus comprising:

a plurality of gas flow transducer elements each sensitive to vibration or acceleration in at least one direction and generating an output signal proportional to gas flow and to a perturbation component resulting from said vibration or acceleration, said elements being arranged on a common support;

a plurality of gas flow passages leading gas flow from an inlet to an outlet through at least one of said elements;

said elements being arranged on said common support and connected to said passages such that at least one of said perturbation component and said gas flow is measured differently by said elements; and

circuitry receiving said output signal of each of said elements and outputting a vibration or acceleration immune output signal corresponding to said gas flow with said perturbation component substantially cancelled.

2. The apparatus as claimed in claim 1, wherein said gas flow passages cause said gas flow to be equal through said elements.

3. The apparatus as claimed in claim 2, wherein said gas flow is split between said elements.

4. The apparatus as claimed in claim 2, wherein said gas flow passes serially through said elements.

5. The apparatus as claimed in claim 4, wherein two said elements are provided that are sensitive to vibration or acceleration along only one axis and are arranged parallel to one another, said gas flow passages being arranged such that said gas flow is in opposite directions through said elements.

6. The apparatus as claimed in claim 1, further comprising a gas throughflow blocking member preventing gas flow in at least one of said elements, wherein said at least one of said elements measures only said perturbation component.

7. The apparatus as claimed in claim 6, wherein said at least one of said elements communicates with said gas flow such that said at least one of said elements is subjected to a same gas composition and temperature as other ones of said elements.

8. The apparatus as claimed in any one of claims 1 to 4, 6 and 7, wherein said elements are sensitive to vibration or acceleration along only one axis.

9. The apparatus as claimed in any one of claims 1 to 4, and 6 to 8, wherein said apparatus comprises two of said elements.

10. The apparatus as claimed in one of claims 1 to 9, wherein said elements comprise thermoanemometer-type transducers.

11. A method of estimating a value of an analog signal using an analog-to-digital converter (ADC) with a level of precision greater than a minimum quantization value of the ADC, the method comprising the steps of:

adding a secondary signal to said analog signal, said secondary signal having a zero DC component, a substantially even and symmetric amplitude distribution and a peak-to-peak amplitude greater than said minimum quantization value;

recording and storing a digital output value of the ADC;

averaging the digital output value recorded over a sampling period to obtain an estimated higher precision digital value with a precision greater than a precision of the digital output value.

12. The method as claimed in claim 11, wherein said secondary signal is provided by a noise signal.

13. The method as claimed in claim 12, wherein said noise signal is generated in amplifier circuitry used to amplify said analog signal.

14. The method as claimed in claim 11, 12 or 13, wherein said analog signal is a gas flow transducer signal, and said gas flow transducer is a thermoanemometer-type transducer apparatus.

15. The method as claimed in any one of claims 11 to 14, wherein said sampling period varies as a function of an amplitude of the analog signal, wherein said sampling period is longer for lower amplitude values and is shorter for higher amplitude values.

16. A method of filtering a gas flow signal comprising the steps of:

measuring an amplitude of the signal;

determining an averaging period τ as a function of said amplitude, wherein τ is longer for lower values of said amplitude and τ is shorter for higher values of said amplitude; and

averaging said amplitude over said period to provide a filtered output signal.

17. The method as claimed in claim 16, wherein said function is a step function.

18. The method as claimed in claim 16 or 17, wherein when said amplitude is above a predetermined threshold, said filtered output signal is the instantaneous value of said amplitude.

19. The method as claimed in claim 16, 17 or 18, wherein said step of measuring comprises converting an analog gas flow transducer signal to a digital signal providing said amplitude.

20. The method as claimed in claim 19, wherein said gas flow transducer is a thermoanemometer-type transducer apparatus.

21. The method as claimed in any one of claims 16 to 20, wherein said step of measuring comprises measuring gas flow using a gas flow receiver.

22. A method of measuring gas flow using a thermoanemometer-type transducer having an output signal that is non-linear with respect to a

physical parameter being measured to obtain a calibrated output signal representing the physical parameter on a given scale, the method comprising:

providing a flow tube having a non-symmetrical-flow-inducing diaphragm mounted in said flow tube, and causing non-symmetrical flow in said flow tube with an accentuated higher pressure near a first portion of said diaphragm than would be sensed in a corresponding cross-section of said flow tube and an accentuated lower pressure near a second portion of said diaphragm than would be sensed in a corresponding cross-section of said flow tube, said transducer being in fluid communication with said first and said second portions;

subjecting said flow tube to a number of calibrated gas flow conditions;

recording a value of said output signal under each of said conditions;

obtaining an analytical solution for a non-linear function relating said value to said gas flow, said solution being expressed as:

$$F(V) = \sum_{i=1}^{N} A_i V^{\frac{i}{\alpha_i}}$$

where V is the transducer output signal; N is greater than or equal to 3; parameters A_i are coefficients determined from said recorded values; α_i are real numbers; and

determining said calibrated output signal for said transducer output signal using said analytical solution.

23. The method as claimed in claim 22, wherein α_i are greater than 1.

24. The method as claimed in claim 23, wherein α_i are non-integers.

25. The method as claimed in claim 22, 23 or 24, wherein said step of determining comprises:

calculating a value of said gas flow for each possible value of said transducer output signal using said analytical solution; and

building a table of said gas flow values indexed by digital output values;

converting said transducer output signal into a digital output value; and

obtaining a value of said calibrated output signal from said table using said digital output value.

26. The method as claimed in one of claims 22 to 25, wherein said analytical solution is exact for each of said recorded values.

27. The method as claimed in one of claims 22 to 26, wherein said analytical function is divided into subranges.

28. The method as claimed in one of claims 22 to 27, wherein said transducer output signal is derived from a gas flow transducer signal having at least one of a square and a near-square transfer function.

29. The method as claimed in one of claims 22 to 28, wherein said flow tube comprises an upstream sensing tube having an upstream orifice communicating with said flow tube via a sidewall of said flow tube at said first portion and a downstream sensing tube having a downstream orifice communicating with said flow tube via said sidewall at said second portion.

30. The method as claimed in claim 29, wherein said diaphragm is mounted to said sidewall between said orifices.

31. The method as claimed in claim 29 or 30, wherein said diaphragm is shaped so as to exhibit high drag and generate maximum accentuated pressure for its size.

32. The method as claimed in claim 29, 30 or 31, wherein said flow tube has a smaller cross-section between said orifices and is similarly tapered on both sides of said smaller cross-section.